

REMARKS

Claims 1-25 are currently pending. The Applicants are herein amending claims 1, 6, 7, 10, and 15. New claims 21-25 are herein added.

The Examiner's acknowledgement of the Information Disclosure Statement filed on Nov. 12, 2003 is noted with appreciation.

Claims 1-14 were rejected under 35 U.S.C. § 102(e) as being anticipated by Wang (U.S. Patent No. 6,515,542).

The Applicants traverse this rejection. In addition, the Applicants have amended the claims to more distinctly define the claimed invention.

As a preliminary matter, the Applicants do not concede that Wang has an effective date that is prior to the Applicants' date of invention. However, in order to move this case to allowance, the Applicants will now argue deficiencies associated with Wang.

The Applicants' independent **claim 1** recites, in part: "A method for diplexer-based dithering a desired signal having a frequency band, the method comprising: ... diplexing with a diplexer the filtered noise signal with the desired signal to produce a signal+noise signal." The Applicants note that the amendments to claim 1 are not intended as narrowing amendments. Rather, the addition of "diplexer-based" and "with a diplexer" are intended to expressly state that which was previously implied in the term "diplexing." The Applicants are aware that there are a number of ways to combine a signal with a noise signal for dithering purposes. However, they are unaware of any prior art that uses a diplexer as recited in claim 1. This lack of "diplexer-based dithering" solutions as claimed by the Applicants is not trivial, and implicates significant and long-standing industry standards and practices.

To that end, and as correctly noted by the Examiner in reference to claims 15-20, Wang fails to disclose or suggest the use of a diplexer to combine the filtered noise signal with the desired signal to produce a signal+noise signal as now expressly recited in the Applicants' independent claim 1.

To anticipate the claimed invention, Wang must disclose each and every limitation

recited in the claims. MPEP § 2131. Wang does not satisfy this standard, as there is no disclosure directed to a diplexer. As such, the Applicants respectfully submit that independent claim 1, as well as its dependent claims 2-6 and 24, cannot be anticipated by Wang.

The Applicants' independent **claim 7** recites, in part: "A method for dithering a desired signal having a frequency band, the method comprising: ... passively combining the amplified noise signal with the desired signal to produce a signal+noise signal, wherein both the desired signal and the noise signal experience insertion loss of 3 dB or less. Thus, this particular claim now limits the combining of the amplified noise signal with the desired signal to be performed "passively" and not by active amplifier circuitry.

In contrast, Wang discloses a differential IF amplifier circuit that includes active noise dithering. In more detail, Wang's amplifier circuit includes two noise generators (100 and 200), two op-amps (112 and 160) and a diff-amp (120). Each op-amp has its non-inverting input coupled to an input signal, and its inverting input connected to a noise generating system. The diff-amp has its inverting input connected to the output one of the op-amps, and its non-inverting input connected to the output of the other op-amp. (Abstract; figures 2, 3, and 7). Wang further discloses that op-amps 112 and 160 "act as summing nodes for the signal and dithering noise." (col. 3, lines 50-51; col. 4, lines 66-67; col. 7, lines 36-37). Thus, Wang is using op-amps to actively combine the signal and dithering noise.

Because Wang does not disclose each and every limitation now recited in independent claim 7 (e.g., "passively combining"), the Applicants respectfully submit that claim 7, as well as its dependent claims 8-14, cannot be anticipated by Wang.

For at least these reasons, the Applicants submit that the invention defined in claims 1-14 and 24 are patentably distinct over Wang, and respectfully request the Examiner to withdraw this rejection.

Claims 15-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang in view of Chemin (U.S. Patent No. 4,263,617).

The Applicants traverse this rejection.

As correctly stated by the Examiner, Wang fails to disclose or suggest the use of a diplexer to diplex the filtered noise signal with a desired signal to produce a signal+noise signal as recited in the Applicants' independent claim 15. To correct this deficiency, the Examiner cites Chemin. In doing so, the Examiner states that it would have been obvious to one skilled in the art to modify Wang to include a diplexer as discussed in Chemin.

As a starting point, the Applicants wish to note that diplexers are normally used in transmission systems (e.g., television or cellular systems) where it is desirable to simultaneously transmit information on two or more carriers using the same antenna. A diplexer separately matches each transmitter to the antenna, and provides isolation between the transmitters. Rules of reciprocity apply in the receive direction. With this long-standing convention in mind, the Applicants submit that they know of no data conversion systems that rely on a diplexer to efficiently carry out a dithering process. Simply stated, diplexers are traditionally used in transmission systems, not data conversion systems. As such, the Applicants believe they have invented a new and non-obvious use of an old device.

In order to understand why the Applicants believe this use of a diplexer to dither a signal is non-obvious, they kindly request the Examiner to consider a number of factors. Firstly, the efficiency problem associated with conventional dithering techniques (e.g., high insertion loss) as discussed in the Applicants' background section has remained a long standing problem. Various design efforts of others have attempted to address this issue, such as the one discussed in Wang (where op-amps are used to actively combine a signal and dithering noise). However, such solutions tend to be costly and involve complex circuitry design. For example, Wang's design requires two noise generators and two op-amps to minimize insertion loss and mismatching in the signal. In this sense, these various design efforts have failed to properly and fully address known problems associated with dithering.

This failure of others is a significant factor supporting the non-obviousness of the Applicants' claimed invention. The Applicants were required to think beyond their normal field of skill, beyond the field of data conversion and digital engineering and into the field of RF engineering (two well-defined and entirely different disciplines), to arrive at the

elegant claimed solution. Many years of circuit design by the Applicants (as well as by others) provided various alternative solutions, with each solution providing various benefits, but never completely addressing all issues, such as simplicity of design and power efficiency. The ultimate use of a diplexer by the Applicants has proven to be a viable and commercially successful solution, another important factor as to the non-obviousness of the claimed invention. This commercial success is substantially attributed to the use of a diplexer as recited in independent claims 1 and 15, and to the passive combining defined in independent claim 7, where both the desired signal and the noise signal experience insertion loss of 3 dB or less.

The Applicants believe that the simplicity of the claimed invention has obscured the unobvious merits of their improvement over other available solutions. Thus, they wish to emphasize that the proposition that a skilled artisan knows everything in a field is restricted by taking into account cognitive limitations of real people, as well as long held design principles underlying the given discipline in which those people work. That diplexers are traditionally and normally used in transmission systems, not data conversion systems, is not a trivial factor here. If the claimed invention were obvious, the Applicants submit that there should surely be at least one reference, whether in the patent database or in a commercial product, that fairly discloses or suggests using a diplexer in the context of dithering as recited in claims 1 and 15, or the passive combining in the context of dithering as recited in claim 7. The Applicants cannot find any prior art evidence of such claimed solutions.

Thus, the Applicants respectfully submit that the long felt need for efficient dithering solutions, combined with the failure of others to arrive at that solution, and the commercial success of the claimed invention, are strong factors demonstrating the non-obviousness of the claimed invention.

In addition to these factors demonstrating the non-obviousness of the claimed invention, Applicants respectfully submit the combination of Wang and Chemin is improper in that, when taken as a whole, there is no motivation or suggestion to combine these references to achieve the Applicants' claimed invention. Section 2143.01 of the MPEP states: "The mere fact that references can be combined or modified is not sufficient

to establish prima facie obviousness.” In addition, the “level of skill in the art cannot be relied upon to provide the suggestion to combine references.”

Rather, there must be some objective reason to combine the teachings of the references to make the claimed invention. The Applicants cannot find such an objective reason, and the Examiner has provided no reason other than ordinary skill in the art, in conjunction with the filtering capability of a diplexer. To the contrary, the Applicants respectfully submit that there is no objective reason to make this combination without first having some knowledge of the Applicants’ claimed invention. In addition, the Applicants respectfully submit Wang actually discourages a combination with Chemin.

In accordance with normal diplexer applications, Chemin discloses a system for transmitting a composite television signal. The system includes a generating device 1 (figures 1, 6, 7, 8) for delivering two carrier signals modulated respectively by the audio and video-frequency information making up a television signal. There is also first and second amplification channels 9 and 19, 10 and 20, 11 and 21 (figures 1, 6, 7), and a summing device 23 (figures 1, 4, 5). The summing device 23 has its inputs coupled respectively to the outputs of the first and second amplification channels 9,19 and 10,20. The output of the summing device 23 provides the transmission system output. (col. 1, lines 33-43). The summing device 23 includes a selective diplexer 70 and a 3 dB hybrid coupler 71. The selective diplexer 70 adds without any appreciable loss the video-frequency carrier signal and the signal which is modulated by the audio-frequency information. (col. 4, lines 33-47). This combined signal is then provided to the antenna for transmission. Thus, Chemin is using a diplexer in the usual way to couple/decouple transmission signals to/from an antenna.

On the other hand, Wang teaches: “It is desirable to enable a differential amplifier circuit that has the properties of even order harmonics cancellation and common mode noise rejection, as well as, an improved spurious free dynamic range.” (col. 2, lines 16-20) To that end, and as previously explained, Wang discloses a differential IF amplifier circuit that includes noise dithering. Significantly, Wang further teaches that op-amps 112 and 160 “act as summing nodes for the signal and dithering noise” (col. 3, lines 50-51; col. 4, lines 66-67; col. 7, lines 36-37). Thus, the primary objective of Wang is the use of op-

amps to combine the signal and dithering noise and to drive the inputs of a diff amp.

With this primary objective of Wang in mind, the Applicants can see no reason why one skilled in the art would be motivated to eliminate the disclosed dual noise source and op-amp circuitry and replace it with the diplexer of Chemin's summing circuit. To do so would require the reader to ignore the primary objective of Wang - to provide a differential amplifier circuit. It would also require the reader to ignore amplification requirements, since a diplexer does not amplify. It would also require the reader to ignore the 3 dB coupler 71 and the load impedance Z included in the summing circuit 23 disclosed by Chemin. Such selective picking from one disclosure to remedy deficiencies of another seems to be based in hindsight reasoning drawn from the Applicants' claims, and therefore improper. The MPEP §2141.02 states that references must be considered in their entirety, including disclosure that teaches away from the claimed invention. For at least these reasons, the Applicants respectfully submit that the requisite motivation to combine or modify is lacking.

Even if there was motivation to do so, note that modifying Wang by Chemin would defeat the intended operation of Wang and would require a substantial reconstruction and redesign of the amplifier circuit disclosed by Wang. In particular, Wang states that each aspect of his disclosure is directed to an amplifier circuit where a noise generating system is connected to the inverting input of an op-amp (e.g., col. 2, lines 25, 30-31, and 41-43). Significantly, Wang's design requires two noise generators and two op-amps to minimize insertion loss and mismatching in the signal provided at the output of the differential amplifier circuit. In contrast, Chemin uses a selective diplexer 70 in conjunction with a 3 dB coupler to form a summing circuit. Simply stated, a diplexer is not known to be a common replacement for op-amps of a diff-amp circuit, let alone one with two noise generators.

The Applicants respectfully submit that to replace the op-amps 112 and 160 (and the supporting circuitry) of Wang with Chemin's selective diplexer 70 would "require a change in the basic principle" under which the Wang construction was designed to operate (use of each op-amp as summing node to drive the input of a difference amp). Such a combination therefore appears to be in contradiction to MPEP § 2143.01, which states that

a proposed modification cannot change the principle of operation of a reference. In this particular case, the “suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [Wang] as well as a change in the basic principle under which the [Wang] construction was designed to operate.” MPEP § 2143.01 Thus, the Applicants respectfully submit the combination is improper.

For at least these reasons, the Applicants respectfully submit that neither Wang or Chemin or their combination disclose or suggest the claimed invention as recited in claims 15-20 and 25. Note that the arguments presented for patentability of claims 15-20 and 25 would equally apply to a rejection of claims 1-14 and 24 based on a combination of Wang and Chemin. Thus, the Applicants respectfully request that this rejection be withdrawn.

Both Wang and Chemin suffer other deficiencies as well. For example, the Applicants’ dependent **claim 6** recites, in part: “wherein the diplexing provides insertion loss associated with the desired signal and the noise signal of 1 dB or less. Dependent **claim 14** recites, in part: “wherein the insertion loss experienced by the noise signal is less than 1 dB.” Dependent **claim 19** recites, in part: “wherein the diplexer provides an insertion loss associated with the noise signal that is 1 dB or less.” Also, note that independent **claim 7** recites, in part: “... passively combining the amplified noise signal with the desired signal to produce a signal+noise signal, wherein both the desired signal and the noise signal experience insertion loss of 3 dB or less.” Thus, the insertion loss associated with the noise signal is limited to 3 dB or less (1 dB or less in the dependent claims).

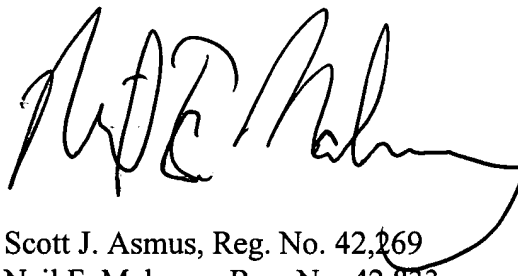
As previously stated, Wang discloses an active amplifier circuit and fails to disclose a diplexer (as recited in claims 1-6, 15-20, and 21-25) or any means for passively combining signals with insertion loss limited to 3 dB or less (as recited in independent claims 7-14). In addition, Chemin discloses the use of a 3 dB coupler 71 in conjunction with the diplexer 70 (which also has some inherent loss). Thus, Chemin’s insertion loss is greater than 3 dB. The only way to eliminate this greater than 3 dB loss is to use the diplexer 70 without the 3 dB coupler. However, Chemin makes no suggestion as to such a use. As such, the Applicants respectfully submit that neither Wang or Chemin, nor their

combination, disclose or suggest the Applicants' claimed invention as recited in independent claim 7, as well as in dependent claims 6, 14, and 19.

The Applicants further believe that new **claim 21** and its dependent claims 22 and 23 are also patentably distinct over the cited references for the reasons explained herein. In particular, claim 21 defines a "method for diplexer-based dithering a desired signal having a frequency band, the method comprising: diplexing with a diplexer a noise signal with a desired signal to produce a signal+noise signal for use in a data conversion process performed by an analog-to-digital converter."

The Applicants believe the above amendments and remarks to be fully responsive, thereby placing this application in condition for allowance. Favorable action is solicited. The Examiner is kindly invited to contact the undersigned attorney by telephone, facsimile, or email for quickest resolution, if there are any remaining issues.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Scott J. Asmus", with a long, sweeping horizontal stroke at the end.

Scott J. Asmus, Reg. No. 42,269
Neil F. Maloney, Reg. No. 42,833

Cus. No. 24222
Maine & Asmus
PO Box 3445
Nashua, NH 03061-3445
Tel. No. (603) 886-6100
Fax. No. (603) 886-4796
Info@maineandasmus.com